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## Typology of the French regional development: revealing the refugee/Schumpeter effects in new-firms startups

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### **Abstract:**

We study the relationships between unemployment rate and new-firm startups rate in France using a quarterly data basis over the 1993-2011 period. At the national level we identify that the *refugee* effect explains the dynamics of entrepreneurship in France over the period 2000-2011. New French firms are mostly set up for necessity motives. At the regional level data analysis methods allow to obtain different classes of regions that represent different type of developments. For each of these classes we are able to identify the existence of *refugee/Schumpeter* effects both in the short-run and in the long-run.

**Keywords:** New firm formation, Business cycle, *Schumpeter* effect, *refugee* effect, data analysis methods, panel data.

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**JEL:** L26, E32, R11, C23, C38

## Introduction

The aim of this paper is to identify the existence of *refugee/Schumpeter* effects (Thurik et al. 2008) in the process of new-firms startups. According to the *refugee* effect unemployment can lead to new firm formation<sup>1</sup> while the *Schumpeter* effect conveys the fact that new firm formation reduces the rate of unemployment<sup>2</sup>. By concentrating on a country, the present study should allow to better understand the regional dynamics of the renewal of the productive system. Regional specificities must be taken into account. Indeed, every region can be characterized in particular by a specific sectorial development, a level of urbanization and qualification of the population etc. Moreover specific trajectories of regional development also exist, in which new-firm startups do not have the same effects or do not answer the same determiners, for complex reasons of specialization and attractiveness but also maybe regional functioning of the labor market, entrepreneurial culture -different attitudes with regard to entrepreneurship (fear of failure, perception of the opportunities of creation, faith in one's own entrepreneurial capacities (Bosma and Schutjens 2011))- , different local financial constraints, (Michelacci and Silva 2007; Bonnet, Cieply, and Dejardin 2005). The long persistence of regional entrepreneurial culture has been proven in Germany (Fritsch and Wyrwich 2012). A global analysis can thus hide the regional specificities; *refugee/Schumpeter* effects may apply differently according to the regions. According to the similar characteristics of regions, we proceeded to the gathering of these ones by using data analysis methods, especially classification methods. This approach allows us to propose a typology of French regional development relative to classes of new-firms startups and unemployment rates. Moreover in order to better characterize classes and the different kind of development of the regions, we introduce variables representative of regional socioeconomic development as supplementary variables.

Because the *refugee/Schumpeter* effects are inter-temporal dynamic relations, the studies estimating contemporaneous relations confused in the past, except Koellinger and Thurik (2012), what are essentially two different relations, each playing in an opposite sense. In this paper we analyze interactions in the short and long run between regional new firm's formation and the regional rate of unemployment in France during the 1993-2011 period. In the short run, tests of causality and calculations of crossed correlations between the cyclic components of the series are developed to identify the existence of leading, lagging or simultaneous relationships between variables. In the long run, a study of cointegration is led both in a time series and in a panel framework. The use of panel data has two advantages: firstly, panel data have two dimensions, temporal and individual promoting a simultaneous study of the dynamics and heterogeneity of agents' behavior; moreover, this dual temporal and individual dimension overcomes the difficulty inherent in time series: the low power of unit root and cointegration tests with small sample size. We use state-of-the-art advances in panel and we apply techniques never employed on such data. The study is thus conducted at the level of the total panel representing the 22 French metropolitan regions like at the level of

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<sup>1</sup> People who are unemployed choose to create their own job.

<sup>2</sup> In an entrepreneurial society most of the new jobs are created by new-firm startups.

given homogeneous classes compared to unemployment and new firm's formation rates. An analysis led on homogeneous classes allows better taking into account the individual heterogeneity (Banerjee and Zanghieri, 2003).

The main results of the paper are twofold. First we are able to conceptualize the regional development according to new-firms startups and unemployment rates and we can identify 4 types of development. The results of data analysis methods confirm the conceptualization because we obtain thanks to data analysis methods<sup>3</sup> 4 classes of regions that represent 3 types of development. Second we show that in the short-run we can identify *refugee* and *Schumpeter* effects that are different according to the different classes of regions obtained. In the long-run, at the global level, the *refugee* effect is dominant. New-firm startups are mainly driven by necessity motives over the period 2000-2011. An increase of the unemployment rate has a positive effect on new-firm startups. These findings underscore the importance for France to set up a national dynamic entrepreneurship activity to support employment and are of primary interest to policy makers. In France around 80% of new-firm startups begin without any salaried people (except the owner-manager) and there is a lack of high growth new firms<sup>4</sup> because many firms are launched with the sole purpose of creating one's own job and limited capabilities for growth. An economy characterized by an insufficient number of jobs created and a high level of persistent unemployment reinforces the setting-up of firms for predominantly constrained motives and discourages entrepreneurship with unconstrained (i.e., entrepreneurial) motives. In France these issues are particularly salient because of the high proportion of current businesses founded by necessity entrepreneurs whose firms will not achieve growth.

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<sup>3</sup> A MFA (multiple factor analysis) based on a weighted analysis of the principal components of all the data coupled with an ascendant hierarchical classification (AHC) on the significant factors of the MFA.

<sup>4</sup> There is no universally accepted definition of what constitutes a high-growth firm. One of the definitions of the high-growth firm is that of firms, generally recent, that employ at least 20 employees and for which staff expenditure other than those relating to executives increased by at least 15% in respect of each of the two previous years. In 2004, the estimation of the new gazelles in UK is 4500 firms per year while in France it is only 3000 firms (Zimmern 2005). Moreover the job figures show that the French gazelles produced 35,000 jobs at the date of creation while 80,000 jobs were created in UK and the gap will grow within 2 to 7 years. The French gazelles will develop very shortly, until approximately 50,000 jobs over seven years, while the English go to reach 150,000 thanks to a 2 to 4 times higher money supply in their social capital.

## 1. Literature review

Entrepreneurship refers to an individual's allocation of human capital that depends upon the economic situation because, according to the *refugee* effect, unemployment can arouse the creation of new firms while the *Schumpeter* effect rather conveys the fact that new-firm startups reduce unemployment<sup>5</sup>. In the past, several authors have focused their research on the measure of the *refugee* and the *Schumpeter* effects. Their results are mixed and most of them failed to measure the real dimension of these two effects because they analyze relations in a static perspective. Storey (1991) noticed the ambiguity of the results where some studies argue for the *pull effect* while other studies support the *push effect*<sup>6</sup>. For example Evans and Leighton (1989) find a *refugee* effect with American data, as Acs, Audretsch and Evans (1994). Storey (1991) finds a mixed effect with American data as Tervo and Niittykangas (1994) at the regional level for Finland and so for Audretsch et al. (2001), for OECD countries. Audretsch and Acs (1994) consider that new-firm startups are positively linked to GDP but also that unemployment has a positive effect on new-firm startups that seems to be contradictory with their first result<sup>7</sup>. Mata (1996) considers that at a national level the *pull effect* is dominant in the case of Portugal –yet he retains new firms with at least five employees at the beginning-. Thurik et al. (2008) reconcile ambiguities in measuring the two effects by using a vector autoregression model. Using panel data from 23 OECD countries for the period 1974 to 2002, they prove the existence of two distinct relationships between entrepreneurship and unemployment. Koellinger and Thurik (2012) find that opportunity entrepreneurship leads the cycle by two years at the global level. The explanation given is that the subset of opportunity driven entrepreneurs that have been identified thanks to the Global Entrepreneurship Monitor (GEM)<sup>8</sup> surveys are more prone to be at the origin of growth in case of newly invented technologies like the Information Technology (IT) boom in the late 1990's for example. Necessity entrepreneurship leads the cycle by one year only. “The opportunity entrepreneurs pave the way for necessity entrepreneurs... that are more prone to be driven by national labor markets conditions”. Using French data, Bonnet and Renou (2000) showed that in the long run, both the increase of the unemployment rate and the increase of the industrial consumption entail a positive variation of the number of new-firm startups. A raised unemployment rate reduces the opportunity cost to become an entrepreneur and then stimulates new-firm startups. In a period of growth (measured by the consumption of industrial products), the optimism of the economic agents is translated by favorable anticipations and incites them to engage in new-firm startups

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<sup>5</sup> Schumpeter (1939) distinguishes major innovations which are at the origin of the cycles of Kondratieff from minor innovations which are at the origin of the cycles of Juglar. During the phases of growth of the cycles, the waves of innovations are explained by the sectorial and chronological grouping of the entrepreneur's imitators.

<sup>6</sup> *Pull effect*: “New firm formation takes place when an individual perceives an opportunity to enter a market to make at least a satisfactory level of profit” (Storey, 1991, p. 171). *Push effect* is related to the diminution of the opportunity cost to engage into entrepreneurship when the individual is in a bad position in the labor market. It is similar to the *refugee* effect sometimes also called *shopkeeper* effect.

<sup>7</sup> A descriptive analysis of GDP and unemployment shows that unemployment is strongly countercyclical.

<sup>8</sup> “The Global Entrepreneurship Monitor (GEM) project is an annual assessment of the entrepreneurial activity, aspirations and attitudes of individuals across a wide range of countries. Initiated in 1999 as a partnership between London Business School and Babson College, the first study covered 10 countries; since then nearly 100 ‘National Teams’ from every corner of the globe have participated in the project, which continues to grow annually”. <http://www.gemconsortium.org/What-is-GEM>

Entrepreneurship then results from an individual decision-making process and is an important conduit of useful and valuable information for commercialization of new ideas, new products, new processes. Kirzner (1985) retains the ability of alertness for defining the entrepreneurial function<sup>9</sup>. Acs (2006, 110) enlarges these abilities to “a set of skills, aptitudes, insights and circumstances that is neither uniformly nor widely distributed in the population”. In particular it is well-known that regions exhibit different levels of entrepreneurial activity and that the revealed hierarchy is constant over a long-period of time (Fritsch and Wyrwich 2012). It is then interesting to analyze the factors favorable to the development of entrepreneurship thanks to the spatial dimension and especially the regional dimension which is, according to Audretsch, the best dimension to study entrepreneurship.

Besides the traditional factors - Capital, Labor even R&D expenditures- that explain the macroeconomic function of production of a country, the “entrepreneurship capital” contributes today in an important way to the differences of paths of growth between the regions of industrialized countries (Audretsch and Keilbach (2005) for the German regions, Sterlacchini (2006) for the European regions). The “entrepreneurship capital” can be defined as a local environment favorable to new firm formation. It is facilitated by the geographical proximity of the new knowledge’s source and more generally by the presence of an environment favorable to its blooming. This environment is constituted by an innovative *milieu* (institutions, organizations that favor the setting-up of innovative firms). In this perspective the number of new firms in proportion of the regional population constitutes a proxy indicator of “entrepreneurship capital” since higher levels of “entrepreneurship capital” are reflected by higher start-up rates, *ceteris paribus* (Audretsch 2007, p.71). Some regions present an environment more favorable to the expression of the entrepreneurial behavior; individuals living in such regions are more prone to be endowed with the absorptive capacity needed to transform knowledge into market opportunities. In these regions higher start-up rates create opportunities for others (Holcombe 1998). The more there are entrepreneurs the more the territory shares information that creates new opportunities to set up a firm that will enhance growth. We can guess that these developed and technological regions could be driven by a *Schumpeter* effect. They constitute our first type of development, (Type 1). Ancient industrialized regions may have high rates of unemployment due to difficulties of reconversion and a weak mobility of the young population that is not highly educated: entrepreneurship rates are not very high and new-firms startups will not create a lot of jobs due to the poor innovative capability of these new firms, (Type 2). This type of development illustrates the reverse version of the *Schumpeter* effect.

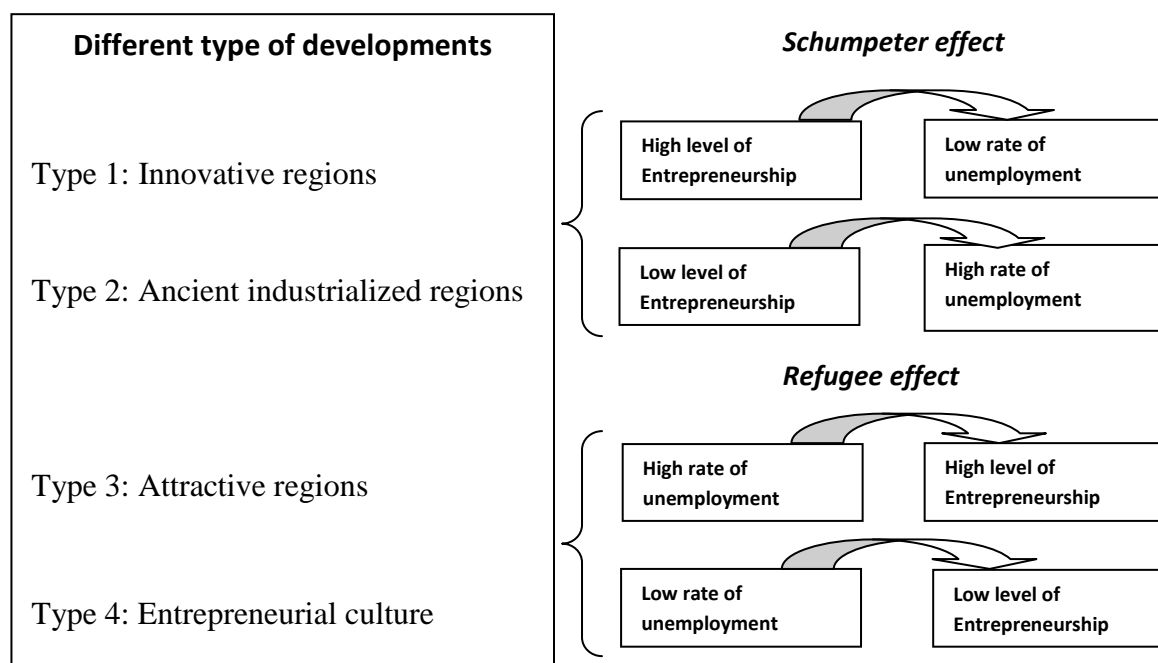
Another type of development based on attractiveness may be identified. “The presence of temporary consumers whom are the tourists appears for certain areas, little favored on the productive plan but endowed with strong residential amenities, as a particularly important economic stake”, Lejoux (2007). In these regions of positive internal migrations both the unemployment rates and the entrepreneurship rates are high. Importance of residential

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<sup>9</sup> It is the ability to perceive opportunities for profit. These opportunities are seized by entrepreneurs because: “If one has become sufficiently alerted to the existence of an opportunity -that is, one has become sufficiently convinced regarding the facts of a situation- it becomes virtually impossible to imagine not taking advantage of the opportunity so discovered”, (Kirzner 1985, p.22).

economy (flows of expenses that are localized in these regions do not provide mainly from the export base activity of these regions but from the attractivity they have upon tourists and retiree people). In these regions we have the illustration of the *refugee* effect (Type 3). Regions endowed with entrepreneurial culture are regions that have based their development upon their own resources. In these regions the unemployment rates are rather low and entrepreneurship rates are not so high because of the development of SME's and the importance of takeovers (Type 4). This type of development illustrates the reverse version of the *refugee* effect. Figure 1 summarizes the different types of development described above.

**Figure 1: Different types of development according to *Refugee/Schumpeter* effects**



## 2. Preliminary analysis

### 2.1 Data presentation

The multidimensional and evolutive data analysis is realized thanks to annual data extracted from INSEE<sup>10</sup> data bases. The rate of unemployment (UNEMPLRATE) and the rate of new-firms startups (NFSTRATE) are considered for the 1993-2011 period. The rate of new-firms startups encompass all activities and, since the beginning of 2009, the new category of “auto-entrepreneurs”<sup>11</sup>. We illustrate the different types of development by a set of socioeconomic variables. These variables susceptible to report the different types of regional developments were positioned as supplementary variables. They do not intervene in the calculations of the characterization of the profiles; on the other hand, they bring very useful information *a posteriori* to consolidate and enrich the interpretation of the classes of regions.

<sup>10</sup> National Institute of Statistics and Economic Studies.

<sup>11</sup> Success was immediate: over 600 000 auto-entrepreneurs got registered in 2009 and 2010. However among administratively active “auto-entrepreneurs”, less than half are economically active and declare a positive turnover. To avoid breaks in the series we brought a correction for the administratively recorded “auto-entrepreneurs” so as to consider only the contribution of paying members who had stated a positive turnover; we used figures published by INSEE concerning the demography of the accounts contributors.

These variables and their availability period are described in Table 1.

Table 1: Supplementary variables

Name	Description	Period
Variables representative of the regulation of the productive system		
INDEPSHARE	share of independent workers in the occupied workforce (wage earners, independent workers, family workers)	1999-2009
FAILRATE	rate of failures by date of publication to the BODACC ( <i>Bulletin Commercial des Annonces Civiles et Commerciales</i> ) per 10000 inhabitants	2000-2008
Variables representative of the sectorial specialization		
MANUSHARE	manufacturing's share of employees in the proportion of the total employees	2000-2008
HTSHARE	share of employees in high-tech manufacturing or in high technology and knowledge-based service sector in the proportion of the total employees	1994-2008
NSTAE	nights spent at tourist accommodation establishments	1993-2011
NCMRATE	net corrected migration rate	2000-2008
Variables representative of the level of development		
GDP	Gross Domestic Product in euros per inhabitant	1993-2011
NHDI	Net Household's Disposable Income in euros per inhabitant	1995-2009
URBRATE	rate of urbanization (share of households living in densely populated areas), more than 500 inhabitants/km <sup>2</sup>	1999-2009
STPSHARE	share of students in the total of pupils	1995-2011
Variable representative of the functioning of the labor market		
LTUNEMPRATE	long-term unemployment rate (12 months and more)	1995-2011

## 2.2 Regional development typology

The approach adopted rests on a combined use of multidimensional and evolutive data analysis methods which takes into account the characteristics of the regions in terms of rates of new-firms startups and unemployment and also their evolution over time for the period 1993-2011. According to the similarity of these characteristics, we can carry out the gathering of the region with an aim of establishing a typology. The usual analyses on annual data do not



allow a global analysis of the regions and their characteristics, because these analyses are carried out separately (year per year) and do not take into account the possibility of having a common structure in time. The total evolution of the regions is thus studied by a multiple factor analysis (MFA) (Escofier and Pagès, 1985.1988), based on a weighted analysis of the principal components of all the data.

This analysis is especially conceived to study individuals -namely the regions- characterized by a certain number of groups of the same variables measured at each different moment in time. The MFA highlights the common structure to a set of groups of variables observed for the same 22 regions of metropolitan France. Its originality lies in the weighting of the variables which balances the influence of the various groups of variables and provides a representation of the regions and variables interpretable according to the usual principal components' analysis. This method makes it possible to consider all the groups on an equal basis. An ascendant hierarchical classification (AHC) was then used on the significant factors of the MFA in order to characterize the classes of the regions relatively to the evolution of the two retained variables. The dendrogram of the figure 2 represents the hierarchical tree of the regions obtained by using an AHC with the Ward criterion<sup>12</sup>.

**Figure 2: Hierarchical tree of the 22 regions of France**

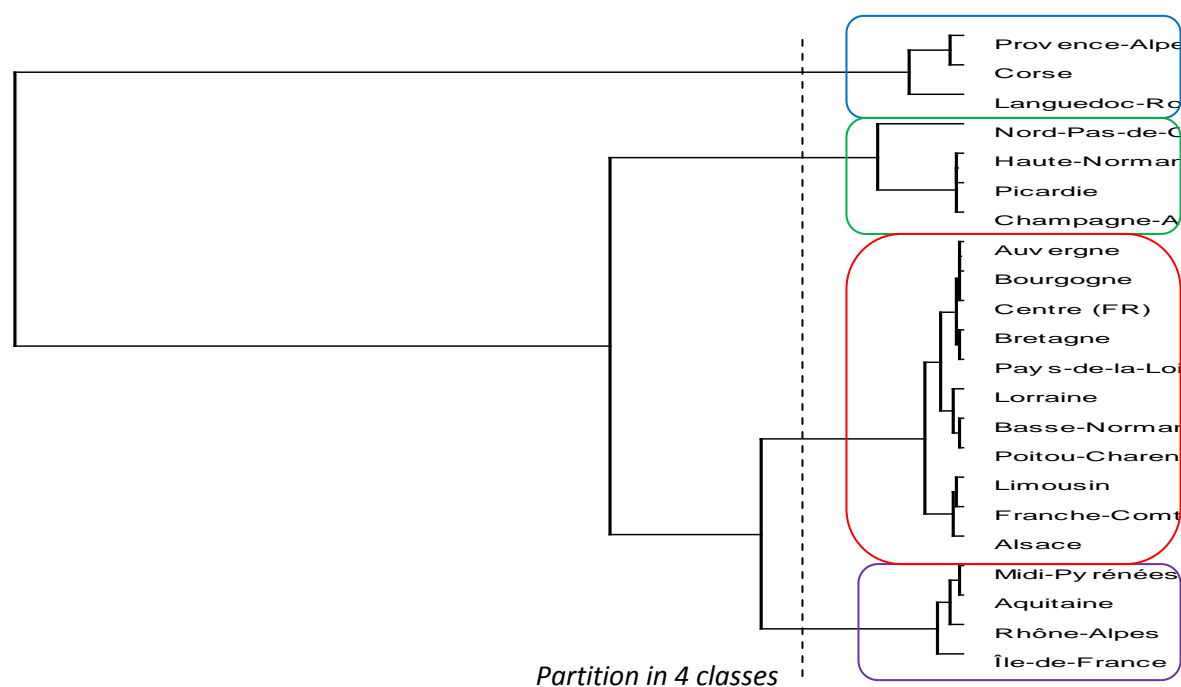


Table 2 summarizes the main results of characterization of the chosen partition in four classes of regions, obtained from the cut of the hierarchical tree of the figure 2. Division is carried out according to the positions of the regions on the factorial axes of the MFA.

<sup>12</sup> Generalised Ward's Criteria, i.e. aggregation based on the criterion of the loss of minimal inertia.

- The first class, including Île-de-France, Aquitaine, Midi-Pyrénées and Rhône-Alpes, shows a rate of new-firms startups higher than the average on the whole of the regions. The class 1 includes strongly urbanized regions, with a high level of GDP and households income per capital. The high-technology sectors represent an important part of the employment; the manufacturing industry is under represented. The educational level seems also upper to that observed in the whole of regions.
- The second class gathers eleven regions: Centre, Basse-Normandie, Bourgogne, Lorraine, Alsace, Auvergne, Franche-Comté, Pays de la Loire, Bretagne, Poitou-Charentes and Limousin. For these regions, the rate of new-firms startups and unemployment rate are significantly low on the whole of the period. These regions present a high share of employment in the manufacturing industry. Rates of urbanization, long-term unemployment and failure of companies are significantly lower than the average of the population.
- The third class, constituted of Champagne-Ardenne, Picardie, Haute-Normandie and Nord-Pas-de-Calais regions, shows a high unemployment rate as well as a rate of new-firms startups significantly lower than that of the whole of the regions. It groups regions showing a high long-term unemployment rate, an educational level lower than the average, a part of the employment in the high-technology sector and a part of self-employed people which are weak. The number of nights spent at tourist accommodation establishments and the migratory balance are significantly lower than the average of regions.
- Finally the other regions of metropolitan France Class 4 are Languedoc-Roussillon, Provence-Alpes-Côte d'Azur and Corse. It is characterized by unemployment rates and new-firms startups higher to those of the national average.

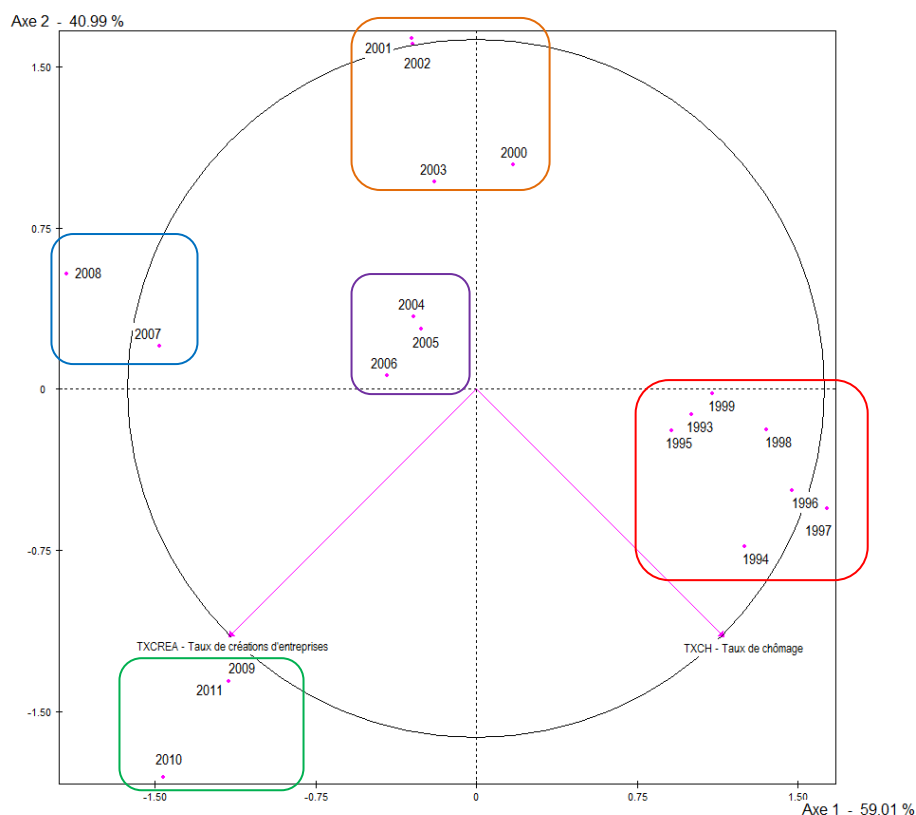
**Table 2: Synthesis of the partition in 4 classes of the 22 regions of metropolitan France.**

	Class 1	Class 2	Class 3	Class 4
Effectif	4	11	4	3
Regions	Île de France Aquitaine Midi-Pyrénées Rhône-Alpes	Centre Basse-Normandie Bourgogne Lorraine Alsace Auvergne Franche-Comté, Pays de la Loire Bretagne Poitou-Charentes Limousin	Champagne-Ardenne Picardie Haute-Normandie Nord-Pas-de-Calais.	Languedoc-Roussillon Provence-Alpes-Côte d'Azur Corse
Profil	+ NFSTRATE		+ UNEMPLRATE	+ NFSTRATE + UNEMPLRATE
Anti-Profil		- NFSTRATE - UNEMPLRATE	- NFSTRATE	
Supplementary variables	+ HTSHARE + STPSHARE + GDP	+ MANUSHARE - LTUNEMPRATE - URBRATE	+ LTUNEMPRATE - STPSHARE - INDEPSHARE	+ NSTAE + LTUNEMPRATE + FAILRATE

	+ NHDI + URBRATE - MANUSHARE	- FAILRATE	- NSTAE - NCMRATE - HTSHARE	+ NCMRATE + INDEPSHARE - MANUSHARE
Type of development		Type 4	Type 2	Type 3

After this first phase of the MFA (called analysis of the “intra structure”) the second phase studies the evolution of the annual average rates of unemployment and new-firms startups at the level of metropolitan France over the 1993-2011 period. In this analysis (called analysis of the “inter structure”) years play the role of “individuals” and average annual rates (UNEMPLRATE and NFSTRATE) the role of variables.

**Figure 3: Representation of the years according to the average rates in metropolitan France**

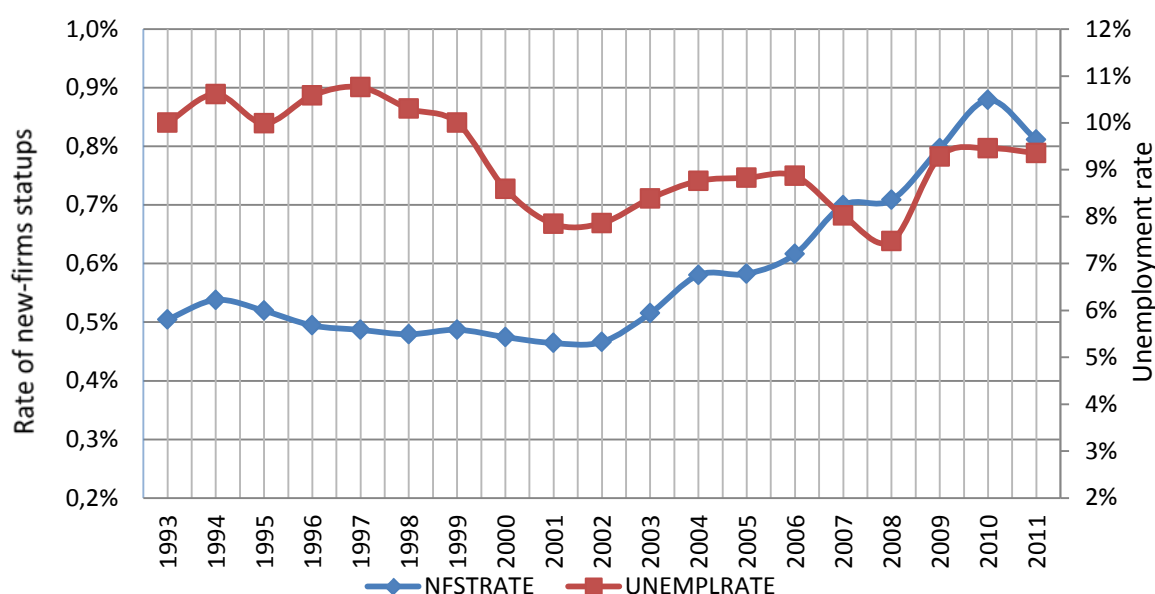


The first main plan of the “inter structure” representation on figure 3 explains 100 % of inertia. The first axis of this representation is interpreted as a time factor; indeed, we notice a practically linear temporal evolution of the years along the axis 1. It means that the UNEMPLRATE and the NFSTRATE which oppose on this axis and which are strongly correlated to this axis vary in a linear way with regard to time. The representation of the “inter structure” on the figure 3 also creates similar groups of years which present common characteristics; these groups are marked out by rectangles. Results of the characterization of the partition in five periods are illustrated on the figure 1 in Annex 1. The main characteristics of each period are summarized in table A1 in Annex 1. The beginning of the studied period, namely from 1993 till 1999, is characterized by a strong unemployment rate and a low rate of new-firms startups. From 2000 till 2003, these two characteristics were almost reversed, the structure of the analyzed rates modified strongly over this period. 2004 to 2006’s period constitutes a

“homogeneous” period; years are characterized by rates of unemployment and new-firms startups equivalent to the average values of the same rates over the total period considered 1992-2011. The period of the years 2007 and 2008 saw a significant decrease of the values of these two rates. The end of period, from 2009 till 2011, is characterized by a rate of new-firms startups very upper to the average.

On the figure 4, the evolution of variables UNEMPLRATE and NFSTRATE is represented for metropolitan France. We notice a linear trend of these variables; the NFSTRATE progressed and the UNEMPLRATE declined over the 1993-2011 period. However, on a first sub period, 1993-1999/2000, we observe rather a decline of the two variables and on the subsequent period rather an increase.

**Figure 4: Evolutions of the rates in metropolitan France over the 1993-2011 period**



These global evolutions will find their explanation according to change in the unemployment benefits policy and in new-firms startups support. As far as the crisis of 1973 continued unemployment benefits have been decreasing and their conditions of attribution became more restrictive. On the contrary the public policies since 1999 aim at supporting the entrepreneurship in France, (Annex 2).

### 2.3 Statistical properties

In order to study the interactions between NFSTRATE and UNEMPLRATE in the perspective of testing the presence of *refugee/Schumpeter* effects according to the different classes of the partition we retain quarterly data that covers the 1993-2011 period. Quarterly frequency allows analyzing very short term interactions between NFSTRATE and UNEMPLRATE. New-firms startups rates were seasonally adjusted by the Census X-12 multiplicative method over the period 1993Q1 to 2011Q4. We develop unit root tests in panel data. The main advantage of these tests is to increase the number of observations by introducing information relating to the individual dimension (the French regions) that allows raising the power of unit root. There are numerous unit root tests in panel data. Indeed, since the seminal works of Levin and Lin

(1992; 1993), successive improvements were brought aiming first of all at taking into account the heterogeneity of the dynamic properties of the series then the dependence between the individuals. We usually distinguish two generations of tests. The first generation of tests is based on the cross-sectional independence assumption<sup>13</sup>, an hypothesis that is difficultly acceptable within the framework of macroeconomic applications. Among these tests, we implemented the tests of Levin and Chien-Fu (1993) and Breitung (2001), based on the hypothesis of a common unit root process. The homogeneity of the autoregressive parameters across individuals under the alternative hypothesis turns out to be very restrictive that is why we also developed the tests of Im et al. (2003) and Hadri (2000) who allow for heterogeneity in the value of the autoregressive coefficient under the alternative hypothesis. Under the alternative hypothesis, some series may be characterized by a unit root while some other series can be stationary. Finally we implemented a second generation test, the Moon and Perron's test (2004) which postulates the interdependence between individuals.

The authors consider a standard autoregressive model with fixed individual effects in which residuals follow a factor model. Their approach consists in the transformation of the model in order to eliminate the common components of the series and on the application of the unit root test on de-factored series to remove the cross-sectional dependencies. Moon and Perron proposed two test statistics, noted  $t_a$  and  $t_b$ .

The results of these various tests are recorded in table 3. The results of the first generation tests are similar at the 5 % level of significance, the hypothesis of unit root is never rejected when series are in level (except for the test of Breitung applied to the unemployment rate for the total panel and for the class 3) while it is systematically rejected when series are in first differences. As regards the second generation tests, results are more ambiguous. The unemployment rate is integrated of order one (excepted in the fourth class) while new-firm startups seem to follow a stationary process on the total panel and for the first and fourth classes. The contradictory result between the tests of the first and second generation can be attributed to inter-individual dependencies of the regional new-firm startups. However, Moon and Perron (2004) specify that the implementation of their test requires having a minimum of 20 individuals to obtain a precise estimation of the number of factors and reliable results. Being given the reduced sizes of our panels, we validate the conclusions stemming from first generation tests and we accept the hypothesis of unit root for new-firm startups. Besides, the use of the first generation tests allows insuring the coherence with the tests of causality and cointegration in panel which are based on the hypothesis of absence of individual dependences. We thus maintain the hypothesis that all the series are integrated by order 1, from then the existence of a long-term relation between the series is possible.

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<sup>13</sup> These unit root tests don't allow for potential correlations across residuals of panel units; within this context, correlations across units constitute nuisance parameters.

**Table 3: Panel unit root tests**

	LLC	Breitung	IPS	Hadri	MP	
					$t_a$	$t_b$
<b>UNEMPLRATE</b>						
<i>Variables : Level</i>						
Total	-1,50 *	-1,88 **	2,81	11,11***	-1,10	-1,18
Class 1	-0,68	-0,55	1,18	3,62***	-0,63	-1,18
Class 2	-0,97	-1,31*	1,97	9,14***	1,22	1,40
Class 3	-0,61	-1,73**	1,13	4,82***	-0,52	-0,53
Class 4	-0,66	-0,24	1,17	2,84***	-2,06**	-1,69**
<i>Variables : First difference</i>						
Total	-16,64***	-7,14***	-10,72***	-1,78	-95,10***	-24,84***
Class 1	-6,47***	-2,44***	-3,89***	-0,83	-39,80***	-12,84***
Class 2	-12,16***	-6,31***	-8,05***	-1,43	-73,53***	-21,52***
Class 3	-7,67***	-2,08**	-5,18***	-0,81	-62,04***	-15,39***
Class 4	-5,40***	-2,62***	-3,16***	-0,19	-45,57***	-11,48***
<b>NFSTRATE</b>						
<i>Variables : Level</i>						
Total	7,93	7,80	6,08	23,06***	-4,32***	-3,97***
Class 1	2,04	3,97	3,47	9,85***	-1,90**	-1,08
Class 2	3,40	3,45	2,91	16,27***	-4,81***	-5,26***
Class 3	5,23	4,99	4,19	10,28***	-0,14	-0,04
Class 4	1,60	2,19	1,97	8,05***	-11,39***	-13,23***
<i>Variables : First difference</i>						
Total	-12,14***	-15,65***	-17,68***	0,02	-229,06***	-73,13***
Class 1	-5,05***	-4,82***	-5,21***	0,23	-100,08***	-16,80***
Class 2	-10,10***	-10,94***	-13,66***	-0,74	-135,07***	-52,16***
Class 3	-4,15***	-4,72***	-7,64***	1,29*	-101,44***	-16,56***
Class 4	-15,67***	-12,94***	-15,58***	-0,29	-92,89***	-14,89***

Notes: the tests of Levin, Lin and Chu (LLC), Breitung, Im, Pesaran and Shin (IPS) and Moon and Perron (MP) are based on the null hypothesis of unit root. The test of Hadri is based on the null hypothesis of stationary; it establishes an extension of the KPSS test.

Moon and Perron proposed two test statistics, noted  $t_a$  and  $t_b$ .

Note: \* (respectively \*\*, \*\*\*) means the rejection of the null hypothesis at the 10 % level (respectively 5 %, 1 %).

### 3. Refugee effect versus Schumpeter effect

#### 3.1 Short run analysis

To characterize the dynamics of new-firms startups on a regional scale in the French case the interactions between the rate of new-firms startups and the unemployment rate are analyzed. In the short run, tests of causality and calculations of crossed correlations between the cyclical components of the series are developed on the total panel constituted by 22 regions and on the subgroups represented by the 4 homogeneous classes established by hierarchical classification.

#### Causality tests

We implemented the Granger non-causality test for heterogenous panel data models proposed by Dumitrescu and Hurlin (2012). It is a test of non-causality in a model of heterogeneous dynamic panel with fixed coefficients. The test statistic is based on the individual Wald statistics of Granger non causality averaged across the cross-section units. It considers the null hypothesis of homogeneous non-causality from a variable  $x$  to a variable  $y$  in a bivariate framework; that means that under the null hypothesis, there is no causal relationship for any of the cross-section units of the panel. On the other hand, the alternative hypothesis does not inevitably imply a relation of causality for all the individuals of the panel, two subgroups of individuals can coexist: a first subgroup of individuals for whom there is a relation of causality from  $x$  to  $y$  and a second subgroup of individuals for whom, on the contrary, there is no relation of causality<sup>14</sup>. Let us specify that this test developed in the line of the test of unit root of Im et al. (2003) suffers the same limits as the first generation tests of unit root because it supposes cross-section independence. Because the series are integrated by order 1, the tests are applied to the series in first differences.

The results of this test, presented in table 4, are much contrasted. They make appear significant differences between the various classes and the total panel. At the 5 % level of significance, a double causality between the rate of new-firms startups and the unemployment rate is proved true for the total panel and for the class 2. A causality of the unemployment rate towards the rate of new-firms startups is also established for the classes 1 and 3. On the other hand, no causality was able to be revealing between both variables in the class 4. These results are particularly interesting because the causalities established between the unemployment rate and the rate of new-firms startups are at the heart of the debate on the presence of the *refugee/Schumpeter* effects.

According to the results obtained, both effects could apply at the national level as well as in the class 2. The *refugee* effect could be present also in the classes 1 and 3. The absence of causality in the class 4 invalidates the existence of the *refugee/Schumpeter* effects at this level. The analysis of the cross correlations between both variables will allow to characterize the effects.

**Table 4: Granger non-causality test**

	NFSTRATE → UNEMPLRATE	UNEMPLRATE → NFSTRATE
Total	2,69***	10,27***
Class 1	1,64*	4,31***
Class 2	2,33**	8,72***
Class 3	0,67	5,53***
Class 4	0,15	-0,23

Note: \* (respectively \*\*, \*\*\*) means the rejection of the null hypothesis at the 10 % level (respectively 5 %, 1 %).

<sup>14</sup> The authors propose two standardized statistics:  $Z\text{-bar}$  based on the moments of the asymptotic distribution of the individual statistics and  $\tilde{Z}\text{-bar}$  based on an approximation of the moments of the distribution for a fixed T sample. For small values of the time series dimension, the standardized statistics lead to over-reject the null hypothesis of non causality and this propensity becomes stronger as the individual dimension increases. We thus prefer the statistics  $\tilde{Z}\text{-bar}$ .

### Cyclical correlations

The cyclical correlations between new-firm startups and macroeconomic variables supply interesting information on the short-run interactions. Following the methodology developed by Hodrick and Prescott (1997) and Kydland and Prescott (1990), we decompose time series into long-run and business cycle components by applying the Hodrick and Prescott filter (with a smoothing parameter of 1600). Then, we calculate the cross-correlations between the cyclical component of new-firm startups (denoted  $x$ ) and the cyclical components of the other series (denoted  $y$ ). The correlation coefficient between  $x(t)$  and  $y(t + j)$  where  $j = 0, \pm 1, \dots, \pm 12$  measures the degree of co-movement of new-firm startups rate and the rate of unemployment over the business cycle. This approach allows us to examine the dynamics of the co-movements of the short-run components and, so, to obtain information about both their strength and their synchronization. Following Fiorito and Kollintzas (1994), we consider that the two cyclical components are strongly correlated, weakly correlated or not correlated for a shift  $j$  when the correlation coefficient is significant at a 1% level, 5 %, not significant at 10 %, respectively. If the cross-correlation  $\rho(j)$  is positive, null or negative then new-firm startups are respectively procyclical, acyclical or countercyclical. Furthermore, if  $|\rho(j)|$  is significant at a 5 % level for a positive, null or negative value of  $j$  then the cycle of new-firm startups is leading the other cycle by  $j$  periods, is synchronous or is lagging the other cycle by  $j$  periods, respectively. The results are recorded in table 5.



**Table 5: Cyclic correlations between new-firm startups and unemployment rate**

$$(\rho(x_t, y_{t+j}); j = -12, -11, -10, -9, -8, -7, -6, -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 \text{ avec } x_t = \text{TXCH})$$

j	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0
Total <sup>a</sup>	-0,02	-0,00	0,02	0,04*	0,04	0,02	-0,00	-0,03	<b>-0,05*</b>	-0,04	-0,02	0,02	0,08***
Class 1	-0,06	0,00	0,09	0,16***	0,16**	0,11	0,02	-0,07	<b>-0,15**</b>	<b>-0,13**</b>	-0,05	0,09	0,27***
Class 2	-0,01	-0,00	0,01	0,03	0,02	0,01	-0,01	-0,03	-0,04	-0,03	-0,02	0,02	0,06*
Class 3	-0,10	-0,04	0,04	0,11*	0,11*	0,05	-0,02	-0,08	<b>-0,14**</b>	<b>-0,12**</b>	-0,05	0,09	0,26***
Class 4	0,00	0,03	0,09	0,14**	0,17**	0,13*	0,05	-0,02	-0,07	-0,07	-0,05	0,04	0,12*

j	1	2	3	4	5	6	7	8	9	10	11	12
Total <sup>a</sup>	0,12***	0,13***	0,11***	0,06**	-0,01	<b>-0,06**</b>	<b>-0,11***</b>	<b>-0,12***</b>	<b>-0,11***</b>	<b>-0,10***</b>	<b>-0,06**</b>	-0,03
Class 1	0,38***	0,41***	0,32***	0,17***	-0,05	<b>-0,21***</b>	<b>-0,36***</b>	<b>-0,39***</b>	<b>-0,36***</b>	<b>-0,32***</b>	<b>-0,23***</b>	<b>-0,12*</b>
Class 2	0,09***	0,10***	0,09***	0,05	0,00	-0,03	<b>-0,07*</b>	<b>-0,08**</b>	<b>-0,07**</b>	<b>-0,07*</b>	-0,05	-0,03
Class 3	0,41***	0,46***	0,41***	0,23***	0,01	<b>-0,17***</b>	<b>-0,35***</b>	<b>-0,38***</b>	<b>-0,35***</b>	<b>-0,31***</b>	<b>-0,21***</b>	-0,09
Class 4	0,16**	0,16**	0,10	-0,01	-0,13*	<b>-0,21***</b>	<b>-0,26***</b>	<b>-0,23***</b>	<b>-0,22***</b>	<b>-0,16**</b>	-0,06	0,05

Note: \* (respectively \*\*, \*\*\*) means the rejection of the null hypothesis at the 10 % level (respectively 5 %, 1 %). In bold, when the evolutions of both variables are countercyclical.

<sup>a</sup> The total sample corresponds to the 22 regions of metropolitan France

The unemployment rate leads procyclically, in the short-run, new-firm startups (1 to 4 quarters) whatever the considered group is. When the unemployment rate increases, the opportunity cost of setting up a firm decreases which favors the new-firm startups. Let us remind you that in the French case a large number of new-firm startups are set-up by unemployed and particularly short-term -less than a year- unemployed individuals (approximately 20 % according to Sine<sup>15</sup>). Indeed, qualified unemployed individuals may be induced to set up a firm in order to avoid the depreciation of their human capital (Bhattacharjee et al. 2008). This sequence illustrates the *refugee* effect. At the horizon of 6 to 11 quarters an increase of the unemployment rate translates into a decrease in new-firm startups. All the individuals who wanted to avoid the depreciation of their human capital have already set-up their firms. If the results obtained at the national level are confirmed at the level of the subgroups of regions, nevertheless differences appear as regards the intensity of these effects. There are particularly marked for the classes 3 and 1, more moderated for the class 4 and weaker for the class 2 and the total panel. Results are more contrasted as regards the effect of a variation of the rate of new-firm startups on the unemployment rate. The entrepreneurial activity leads countercyclically the unemployment rate on horizons of 2 and 3 quarters in the classes 1 and 3. An increase in the entrepreneurial activity will itself lead to a reduction in the unemployment. It is an illustration of the *Schumpeter* effect. However in the longer term (8 and 9 quarters), an increase in new-firm startups leads to an increase in the unemployment rate which can be interpreted by the fact that some new companies are going to disappear for the classes 1 and 4.

### 3.2 Long-run analysis

The study of the cointegration makes it possible to highlight stable long-run relations between non-stationary series. The series being all integrated of order 1, the existence of a long-run relation between them can be considered. To apprehend the long-run relations between new-firm startups and unemployment rate we implement cointegration tests both on panel data and on each group of regions. As for the first generation of panel unit root tests, the distinction between the various tests is related to the presence or not of heterogeneity within the panel. We consider the tests proposed by Pedroni (1999; 2004) and Kao (1999). Pedroni proposed tests based on the null hypothesis of no intra-individual cointegration for homogeneous and heterogeneous panels. Four are based on the within dimension (pooled tests) and three on the between dimension (group mean tests). The tests based on between dimension are more general in the sense that they allow for heterogeneity between individuals under the alternative hypothesis. The test of Kao is also based on the null hypothesis of no cointegration and supposes the homogeneity of cointegrating vectors in the individual dimension.

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<sup>15</sup> French information system on new companies.

**Table 6: Panel cointegration tests over the 1993-2011 period**

	Pedroni							Kao
	Pooled cointegration tests				Group mean cointegration tests			t-stat
	v-stat	rho-stat	PP-stat	ADF-stat	rho-stat	PP-stat	ADF-stat	
Total	2,61 (0,00)	-1,53 (0,06)	-1,61 (0,05)	1,08 (0,86)	0,31 (0,62)	-0,56 (0,28)	2,31 (0,99)	-3,27 (0,00)
Class 1	1,15 (0,12)	-0,53 (0,29)	-0,50 (0,31)	0,25 (0,60)	0,30 (0,62)	0,01 (0,50)	0,77 (0,77)	-1,66 (0,05)
Class 2	2,93 (0,00)	-1,92 (0,03)	-1,61 (0,05)	0,55 (0,71)	-0,29 (0,38)	-0,73 (0,23)	1,60 (0,94)	-2,82 (0,00)
Class 3	-1,44 (0,07)	-1,23 (0,10)	-1,49 (0,06)	-0,35 (0,36)	-0,24 (0,41)	-1,01 (0,16)	0,34 (0,63)	-1,32 (0,09)
Class 4	-0,47 (0,68)	0,65 (0,74)	0,44 (0,67)	0,95 (0,83)	-1,32 (0,91)	1,02 (0,85)	1,56 (0,94)	-0,81 (0,21)

Note: p-values are given in parentheses.

The results of the cointegration tests are presented in table 6. These results are much contrasted at the same time according to the considered sample and according to the intra or inter-individual dimension. As it is often the case, the results stemming from tests of Pedroni are not corresponding. If we consider the tests based on the intra-individual dimension, at the 5 % level of significance (respectively 10 %), we notice that 3 tests on 4 lead to accept the hypothesis of cointegration for the class 2 (respectively for the total panel and for the class 3). These results are confirmed by the test of Kao, which also highlights the presence of a relation of cointegration for the class 1. On the other hand, if we refer to the most general tests, based on the inter-individual dimension, we notice that no long-run relationship can be established between the unemployment rate and the rate of new-firm startups whatever the considered class is. It seems to us convenient to favor the most general tests, that bring us to record the existence of a relation of cointegration between both series on the 1993-2011 period.

However, we noticed a contrasted evolution of the rate of new-firms startups over the period. Indeed, it seems that during the 90s the French entrepreneurial activity is little dynamic and set back. The dynamism of the entrepreneurship begun at the beginning of 2000s led us to intend to look for the existence of a long-term relation between the rate of new-firms startups and the unemployment rate over the period 2000-2011. We thus implemented the tests of cointegration over this sub-period, the results are put back in the picture A2 in appendix. At the 5 % level of significance (respectively 10 %), 5 (respectively 7) tests on 8 bring us to end in the existence of a relation of cointegration between the rate of new-firms startups and the unemployment rate for the total panel. This result is particularly interesting because it means that the rate of new-firms startups and the unemployment rate are bound in the long term at the national level. On the other hand, at the level of the classes, the results remain mitigated and do not allow accepting the hypothesis of cointegration<sup>16</sup>.

<sup>16</sup> We have checked that the classification does not change over the period 2000-2011.

The long-term relation presented below is estimated for the total panel. The value into bracket corresponds to the t statistic of Student.

$$\text{NFSTRATE} = 0,03 + 0,015 \text{ UNEMPLRATE} \quad (1)$$

(2,85)

At the national level, we notice that an increase of the unemployment rate is translated by an increase of the rate of new-firms startups; the *refugee* effect play completely and explains the dynamics of entrepreneurship in France over the period 2000-2011.

#### 4. Conclusion

The present paper investigates the relationships between the unemployment rate and new-firm startups both in the short-run and in the long-run with French regional panel data. The originality of this work lies both in the scope and in the estimation methods employed. To our knowledge this is the first empirical study considering entrepreneurship and business cycle at a regional level. The use of recent developments of econometrics of non-stationary panel data allows us to analyze both short-term and long-term relationships between business cycle and entrepreneurship. Our empirical results highlight many interactions between entrepreneurship and employment. We find that unemployment rates and new-firm startups are closely linked in the short-run and to a lesser extent in the long-run. In the short term, we show evidence of the presence of the *refugee* effect and the *Schumpeter* effect. The increase of the unemployment rate leads to an increase of the entrepreneurial activity during four quarters, confirming the existence of the *refugee* effect. An increase in the entrepreneurial activity leads also to a reduction in the unemployment rate over the same period, this latter attesting the existence of the *Schumpeter* effect. Two effects impact the unemployment rate: the individuals who create sometimes go out of unemployment; the growth generated by a more dynamic economy is at the origin of new hiring. However after two years some companies do not survive and thus we again observe an increase in unemployment. The results obtained at the national level are confirmed at the regional level, but the *refugee* effect seems to be dominant at this level. However differences appear between regions. In the long term, the rate of new-firms startups and the unemployment rate are bound but only at the national level. We highlight the presence of the *refugee effect* at this level.

Several explanations in France may be put forward as to the factors deterring *pull motives*, that is to say the setting-up of innovative companies. Among them one may notice the importance of the Switching cost and the functioning of the labor market. In France the low involvement of French elites in innovative entrepreneurial activity is related to the sunk cost this kind of population incurs in entrepreneurial activity (Bonnet, Cussy, 2010). Their human capital gets better valorization within a smooth and unriskey carrer path (within which their graduate titles and alumni networks come into play). Moreover the functioning of the French labor market –which is not flexible- enhances *push* motives and mainly discourage *pull* motives (Bhattacharjee et al. 2008). The effect of the discouragement of the right type of entrepreneurship is superior to the *refugee effect*. So France records a weak global

entrepreneurial propensity and especially few firms that are able to know a high level of growth.

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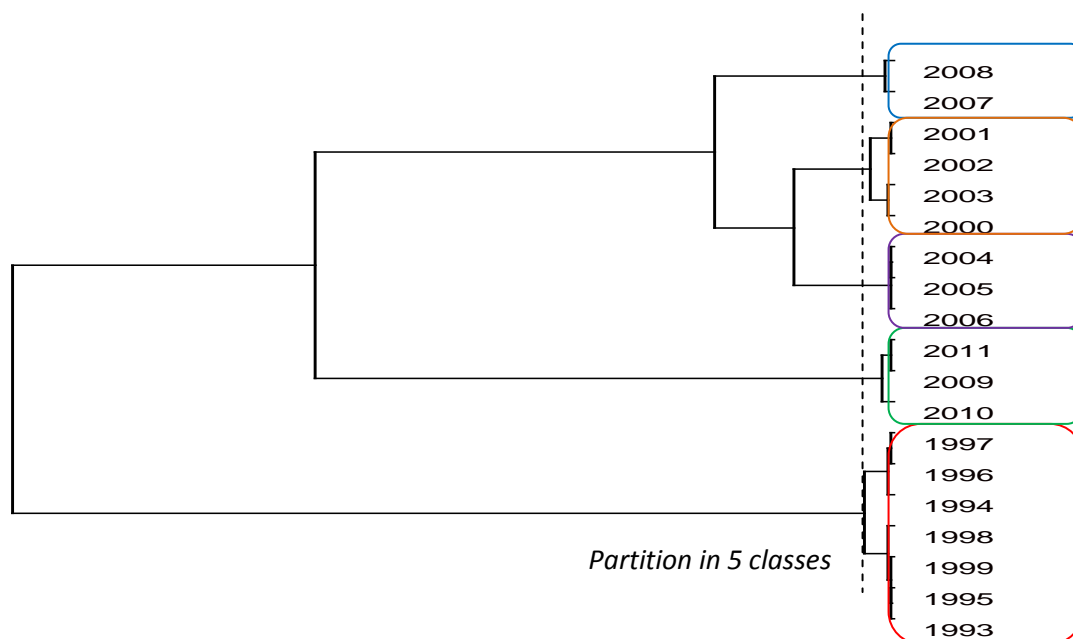
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## Annexes

### Annex 1

**Figure A1: Hierarchical tree of years of the 1993-2011's period**



**Table A1: Synthesis of the partition of the years in 5 periods**

	Period 1	Period 2	Period 3	Period 4	Period 5
Duration	7 years	4 years	3 years	2 years	3 years
Years	1993 1994 1995 1996 1997 1998 1999	2000 2001 2002 2003	2004 2005 2006	2007 2008	2009 2010 2011
Profile	+ UNEMPLRATE	+ NFSTRATE	<i>homogeneous</i>		+ NFSTRATE
Anti-Profile	- NFSTRATE	- UNEMPLRATE		- NFSTRATE - UNEMPLRATE	

## Annex 2

### Legislation on unemployment benefits

Unemployment benefits have decreased over time. Of 100 % of the previous gross salary at the beginning of the 1973's crisis (that could represent 110 % of the net salary in certain cases of training course), the allowance is going to decrease till 65 % then 57 % of the previous gross salary with the appearance of a waiting period, of a minimal working time in the previous six months and of a strong decrease in the time).

### Legislation on entrepreneurship support

1999: Implementation of the program EDEN (Encouragement in the Development of the New Companies).

2001 (july): Possibility to cumulate income stemming from the new entrepreneur's company with her/his unemployment benefit during a maximum of 18 months. In case of bankruptcy of the company, her/he is entitled to unemployment benefits for a maximum duration of 3 years after the loss of the employment preceding the setting-up of the company.

2002: The ACCRE (financial support –social and tax cuts- for unemployed who set up their firms) can be accumulated with EDEN (bonus for the new-firm startup). These modifications strengthened the financial safety of the entrepreneur.

2003 (august): The law for the economic initiative, said law Dutreil, has the objective to make of France one of the European countries the most favorable to new-firms startups.

2006: Directive to capitalize the remaining unemployment benefits.

2009: Legislation on the auto entrepreneur.

### Annex 3

**Tableau A2 : Tests de cointegration en panel sur la période 2000-2011**

	Pedroni							Kao
	Pooled cointegration tests			Group mean cointegration tests				
	v-stat	rho-stat	PP-stat	ADF-stat	rho-stat	PP-stat	ADF-stat	t-stat
Total	7,31 (0,00)	-3,7 (0,00)	-3,42 (0,00)	-1,43 (0,08)	-1,33 (0,09)	-2,49 (0,00)	-0,03 (0,49)	-4,10 (0,00)
Class 1	2,87 (0,00)	-1,30 (0,10)	-1,13 (0,13)	-0,51 (0,30)	-0,33 (0,37)	-0,71 (0,24)	-0,01 (0,51)	-2,53 (0,00)
Class 2	5,72 (0,00)	-2,68 (0,00)	-2,20 (0,01)	-0,42 (0,34)	-0,98 (0,16)	-1,50 (0,07)	0,65 (0,74)	-2,86 (0,00)
Class 3	4,14 (0,00)	-2,01 (0,02)	-1,70 (0,04)	-0,68 (0,25)	-0,87 (0,19)	-1,31 (0,09)	-0,11 (0,46)	-2,24 (0,01)
Class 4	1,46 (0,07)	-1,24 (0,11)	-1,81 (0,03)	-1,55 (0,06)	-0,30 (0,38)	-1,53 (0,06)	-1,21 (0,11)	-2,38 (0,00)

Note: p-values are given in parentheses.